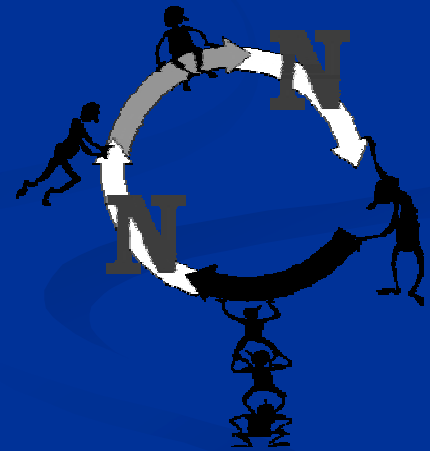


The Challenge of Wastewater on Cape Cod

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&
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The opinions expressed herein are not necessarily those of the Massachusetts Department of Environmental Protection, the United States Environmental Protection Agency or the Barnstable County Department of Health and the Environment, neither does the mention of any product or procedure constitute an endorsement of such by those agencies.

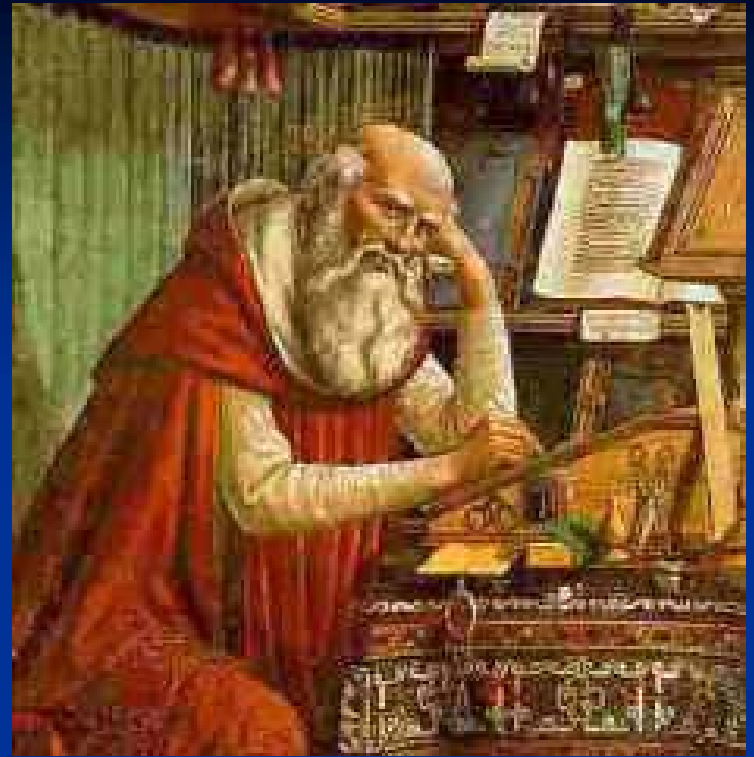


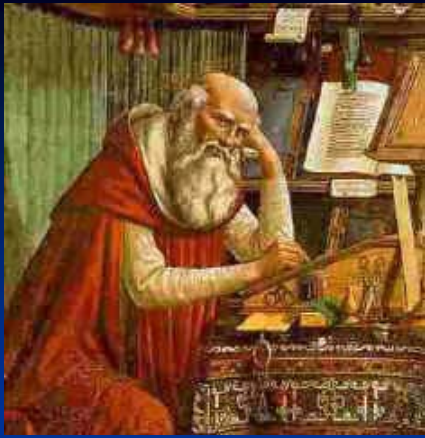
Beginning Assumption:

Somehow we need to dispose of our wastewater. (We might even have to treat it!)

Wastewater Management

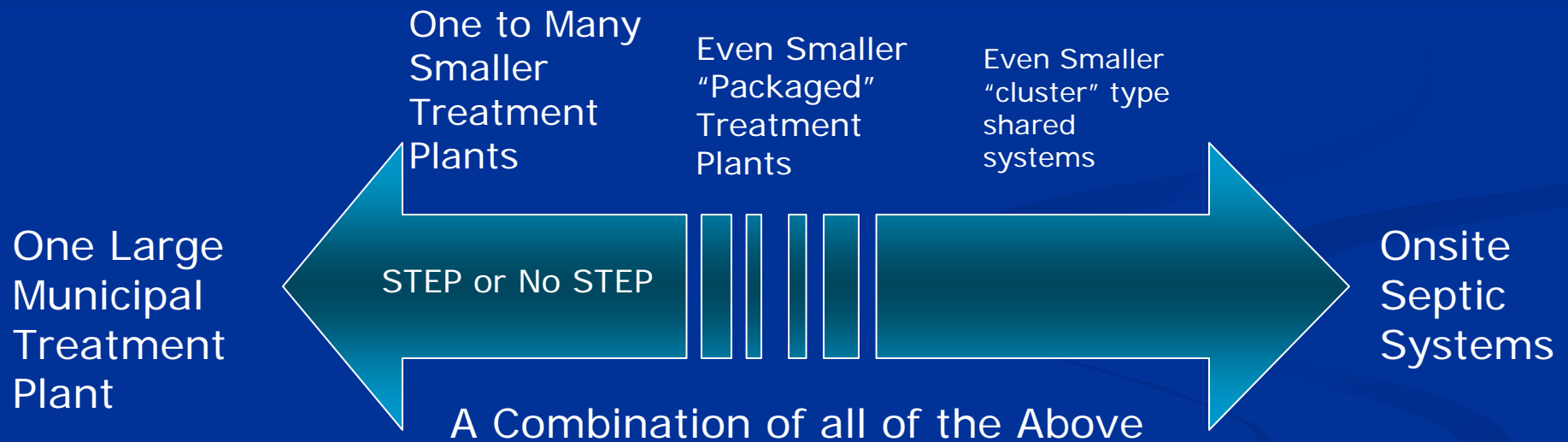
How will we know
what's best?





Wastewater Management

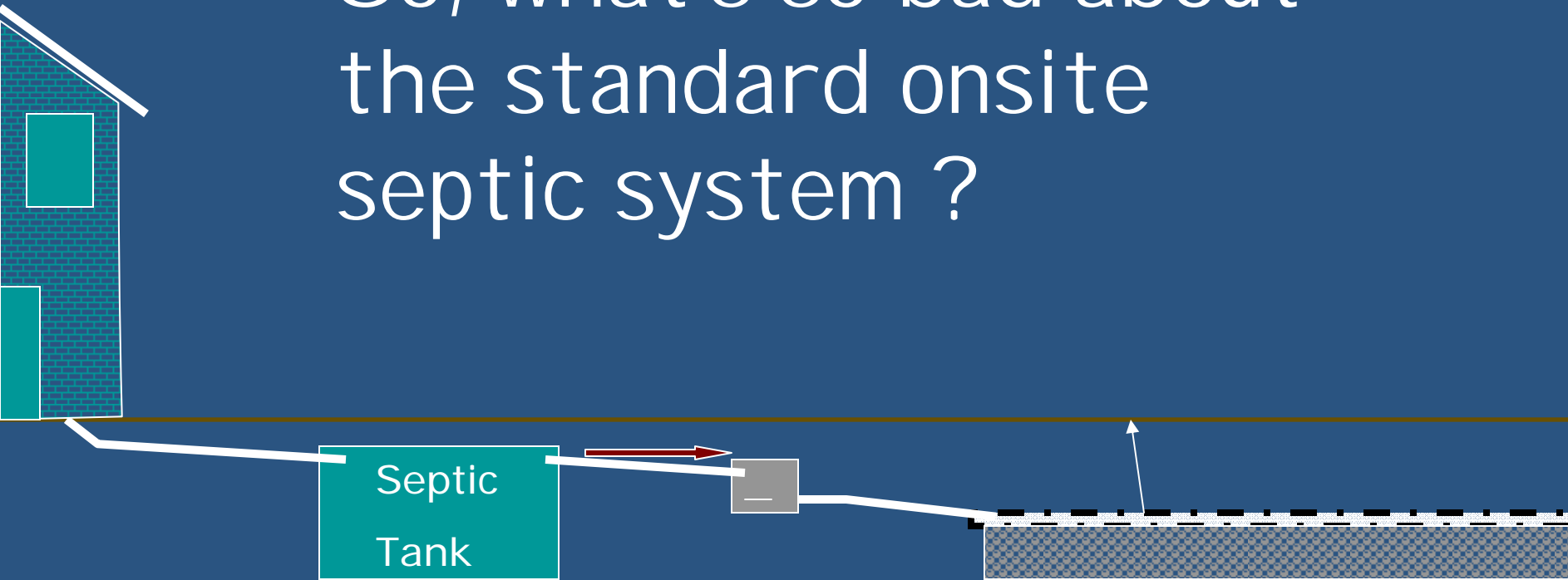
How will we know what's best?

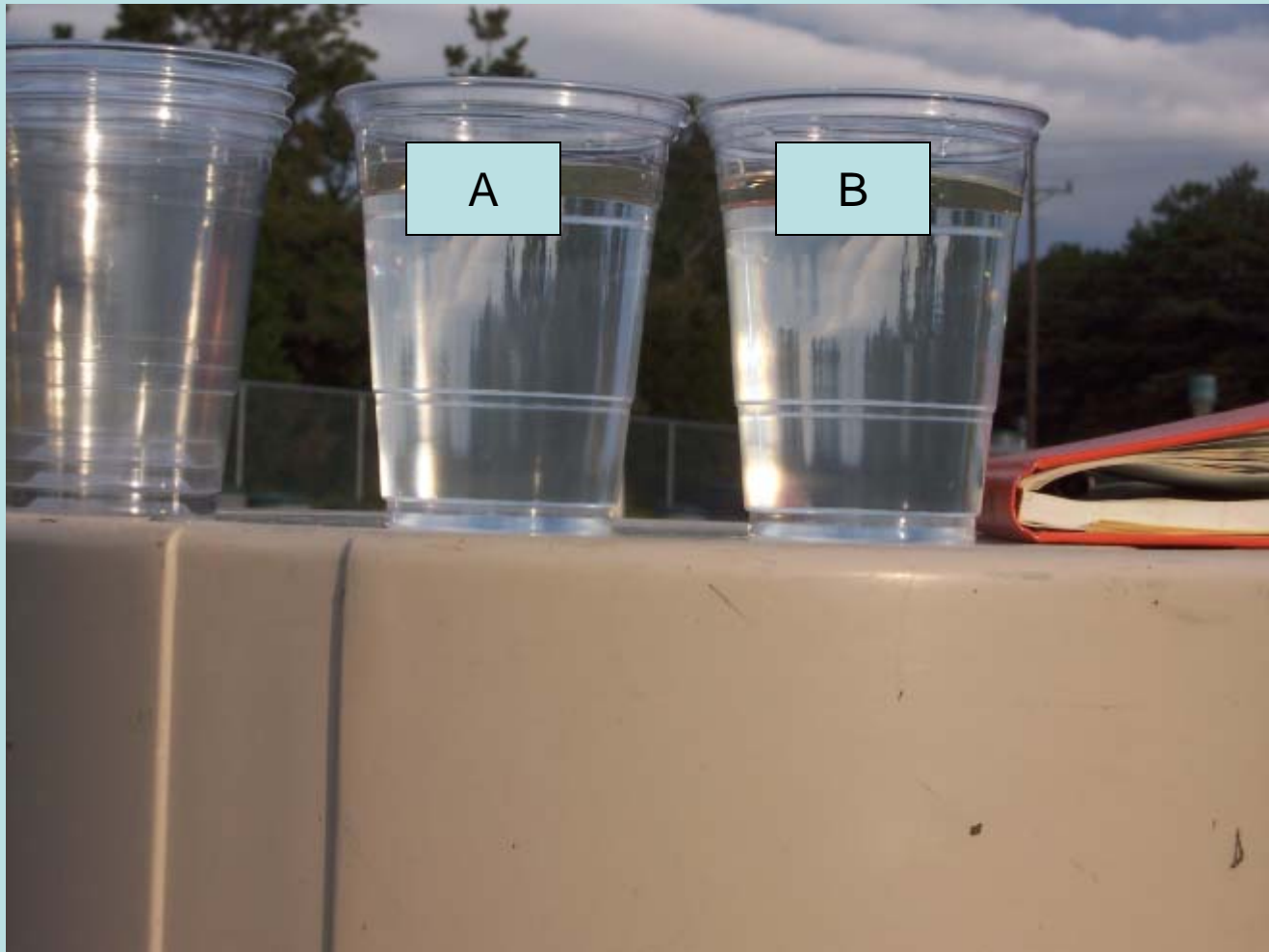


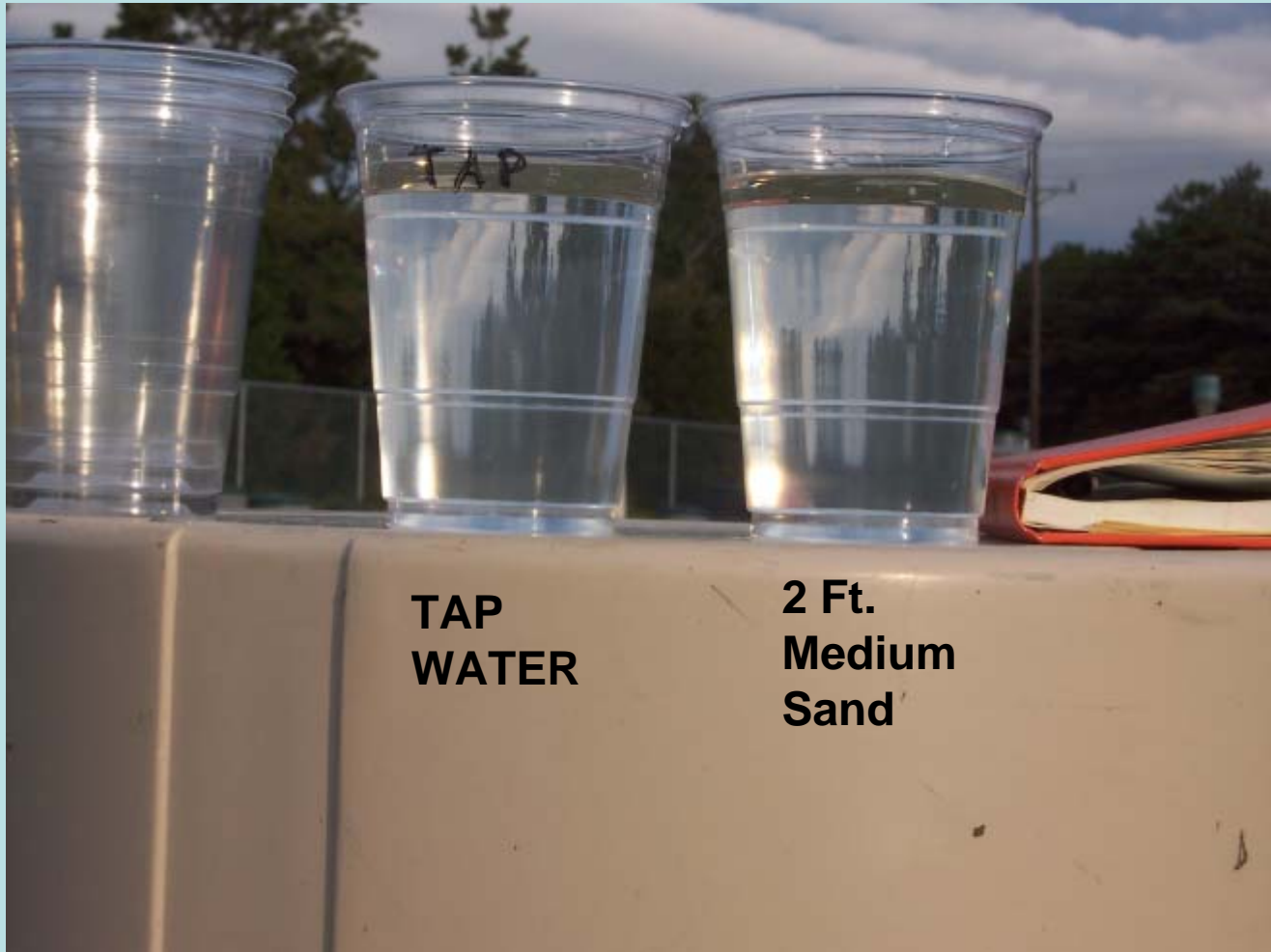
The “default” option of wastewater management on Cape Cod (and much of Massachusetts) is the onsite septic system.

“default” means what will eventually happen if we do nothing but what we generally do now.

So, what's so bad about the standard onsite septic system ?







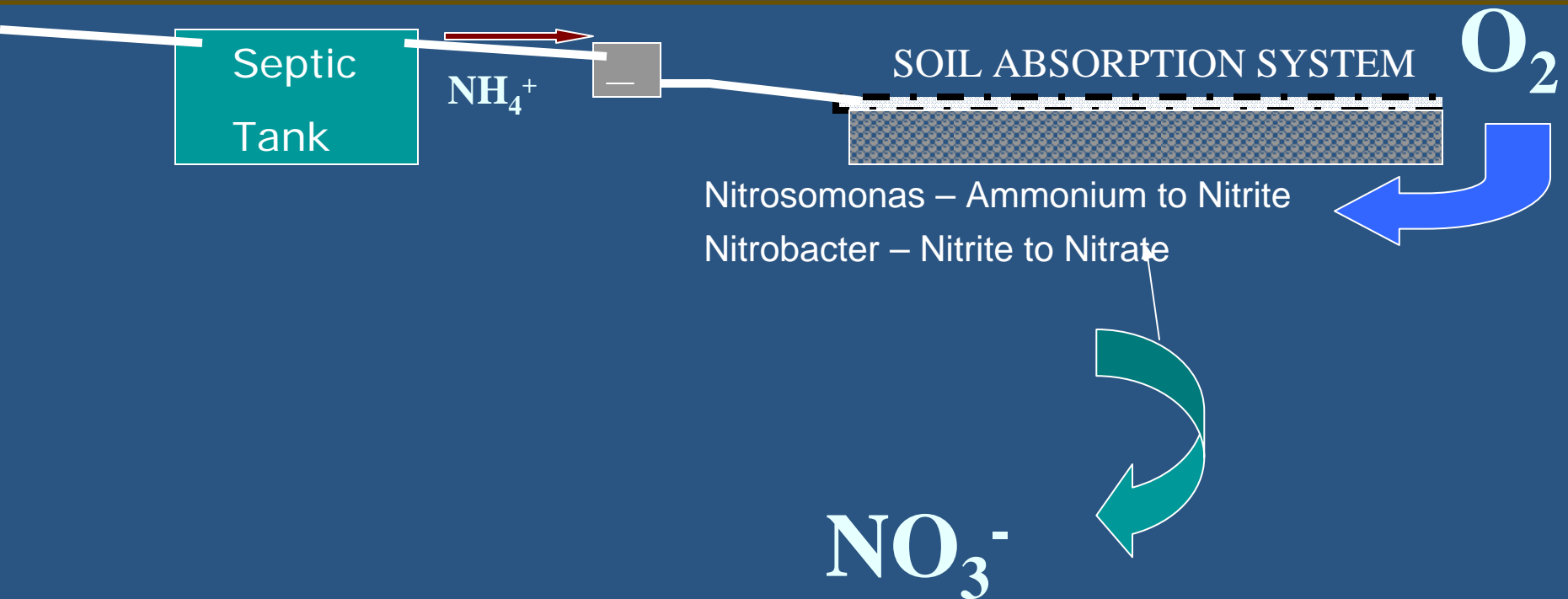
**TAP
WATER**

**2 Ft.
Medium
Sand**

The challenge, in Cape Cod's geological setting is to remove nitrogen from wastewater



While the standard septic system efficiently stabilizes the wastewater and disposes of it, they only transform the nitrogen in wastewater to nitrate which conservatively moves in the groundwater toward the ocean.



The Impacts of Nitrogen in Marine Settings





O₂

O₂

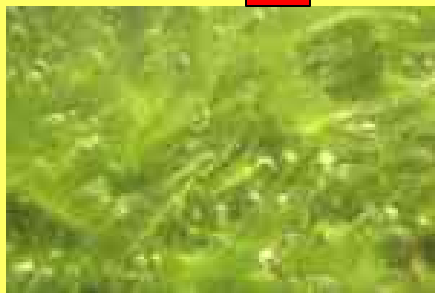
O₂

O₂

O₂

O₂

O₂



O₂

DAYTIME - Oxygen Production
NIGHT - Oxygen Depletion

Decomposition

O₂



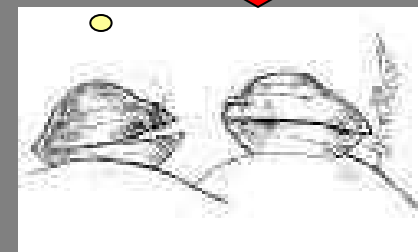
It's going to be a long night.



Respiration

O₂

O₂



So, what is “adequate” Wastewater Treatment ?

It Depends on Who you Ask !

A stylized, dark teal silhouette of a mountain range is located in the bottom right corner of the slide, partially overlapping the text area.



A whirlwind tour
through the world of
onsite septic
systems that remove
nitrogen.

Operated by

**Barnstable County Department
of Health and the Environment**

In cooperation with

Massachusetts DEP

New England Region EPA



**MASSACHUSETTS ALTERNATIVE
SEPTIC SYSTEM TEST CENTER**



RSF Recirculating Sand Filters

From House

Septic Tank

Pump Chamber

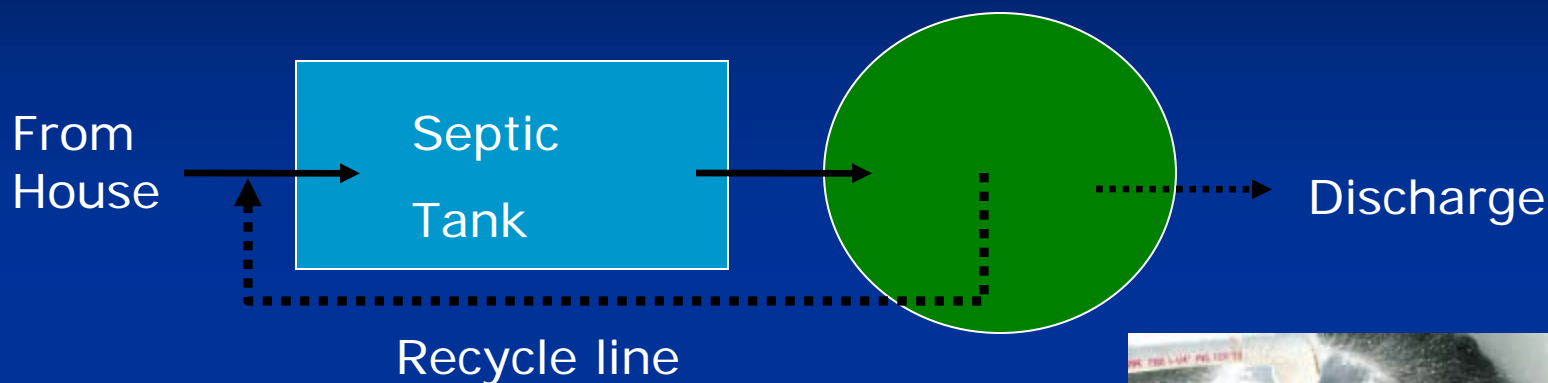
Recirculating Sand Filter



Generally expect TN~ 20-25 mg/l, but there are possibilities for higher removal rates with design modifications and oversight.

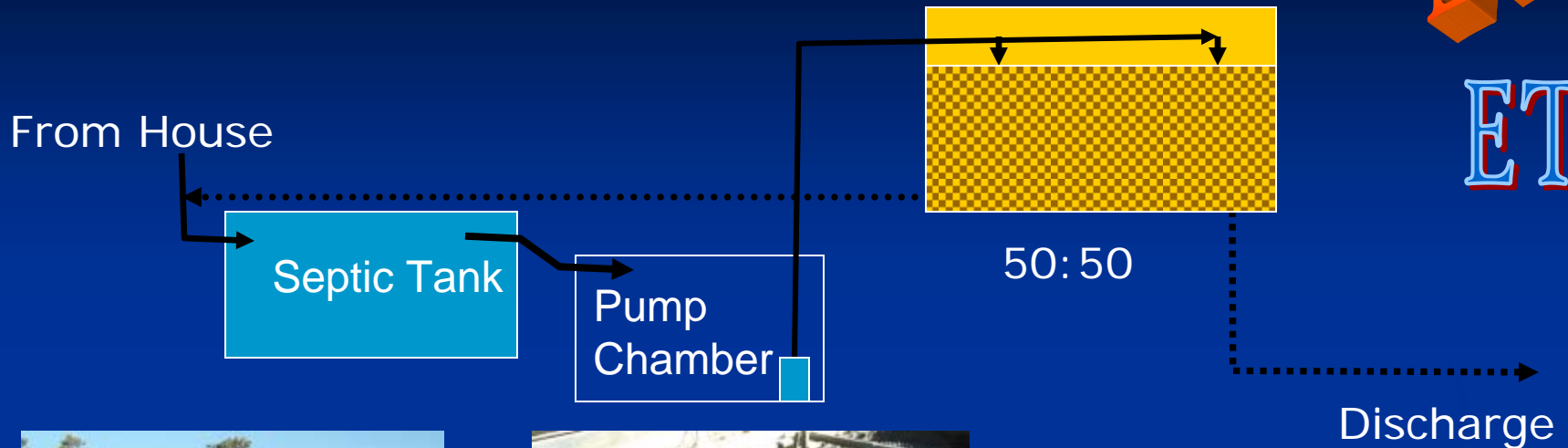


Bioclere



	Effluent (TN mg/l)	Influent (TN mg/l)
Mean	15.6	37.9
Median	13.5	38.0
Count	52	82

Waterloo Biofilter



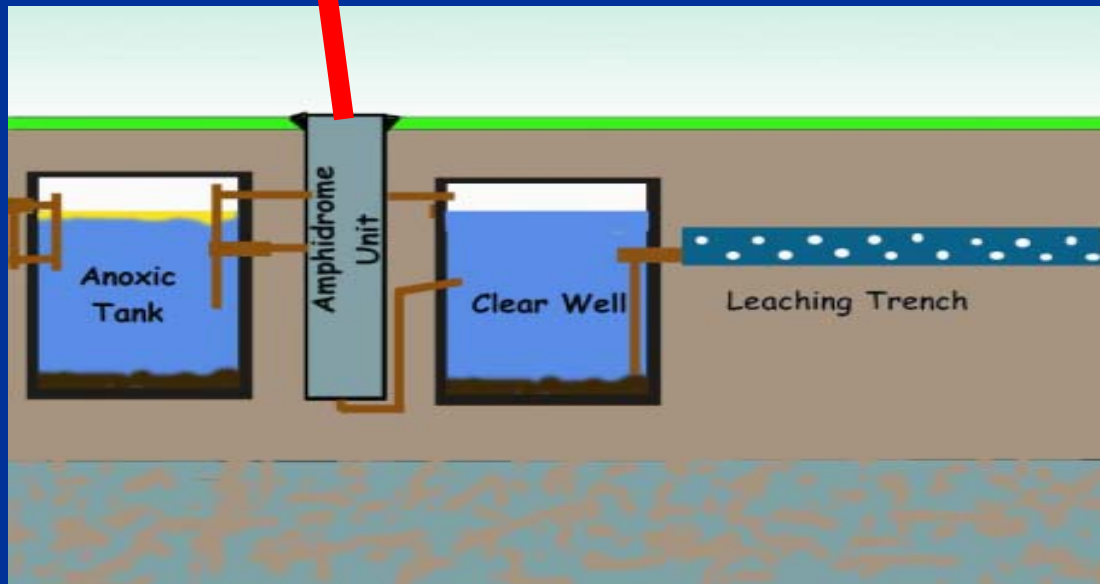
Generally TN ~ 15-17 mg/l TN.
Excursions related to short circuiting.



	Influent TN (mg/l)	Effluent TN (mg/l)
Mean	37.5	15.4
Median	38.0	12.9
Count	103	87

Amphidrome®

ETV
ETI



Generally $TN < 15$. Performance excursions related to sludge buildup in primary tank

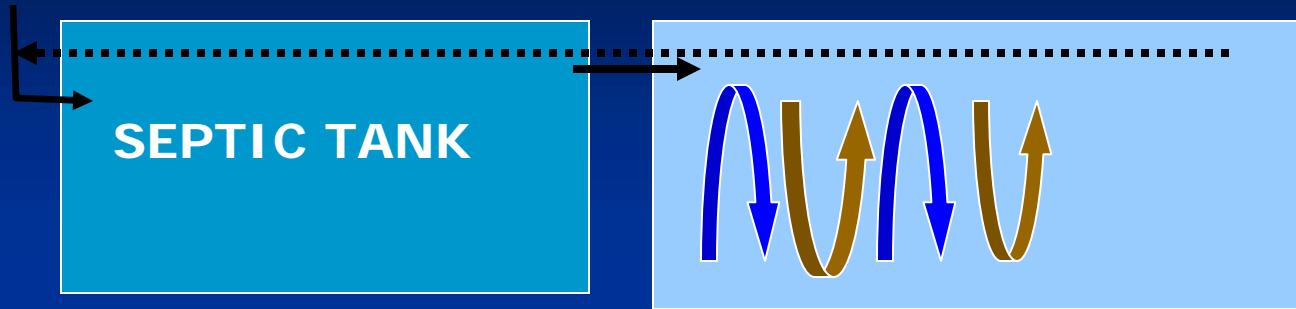
	Influent TN (mg/l)	Effluent TN (mg/l)
Mean	36.8	15.0
Median	37.0	14.3
Count	60	53

SEPTITECH



From House

SEPTITECH UNIT

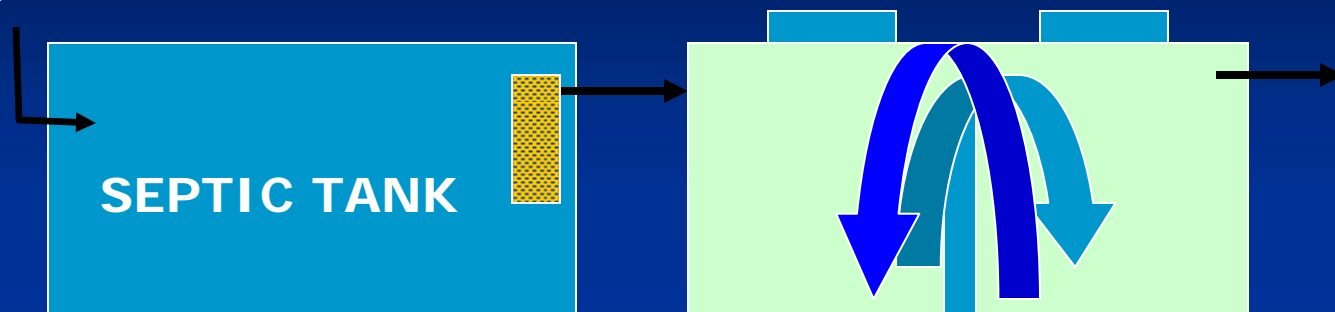


	Influent TN (mg/l)	Effluent TN (mg/l)
Mean	38.0	13.8
Median	38.0	13.8
Count	98	57

ReCip

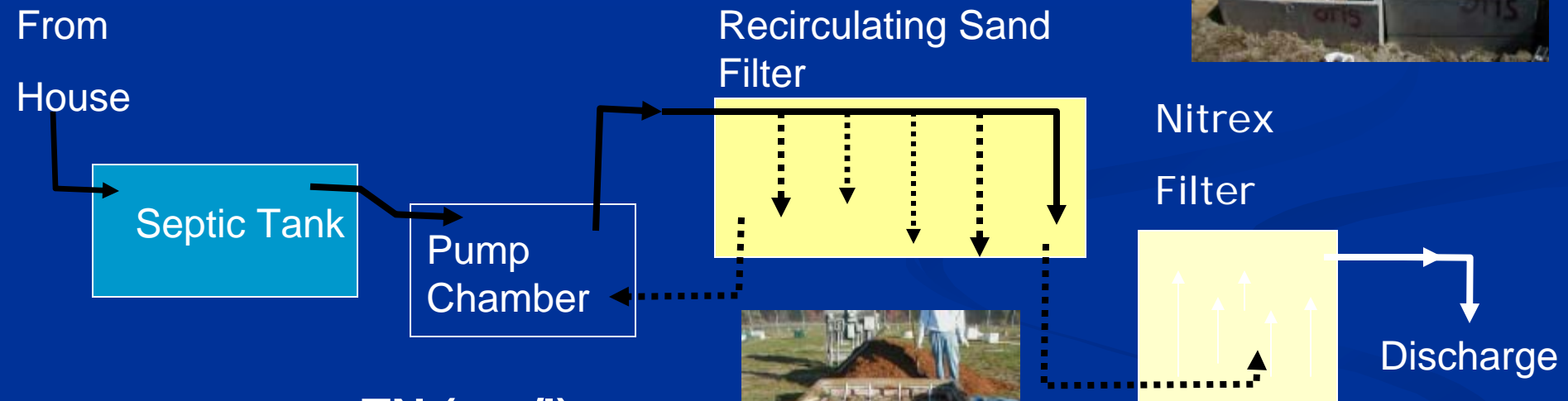


From House



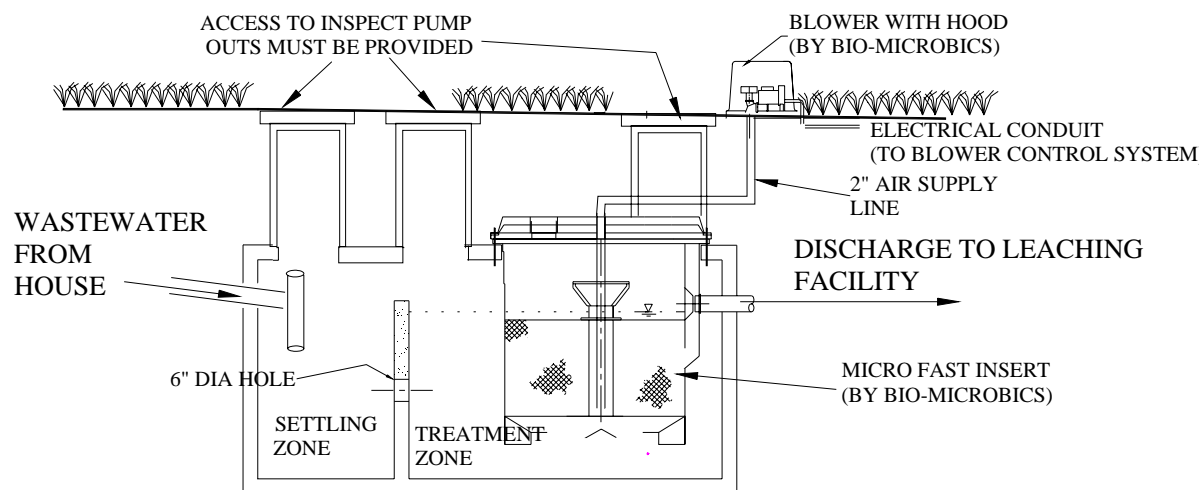
	Influent TN (mg/l)	Effluent TN (mg/l)
Mean	36.0	15.0
Median	36.0	15.0
Count	53	53

Nitrex



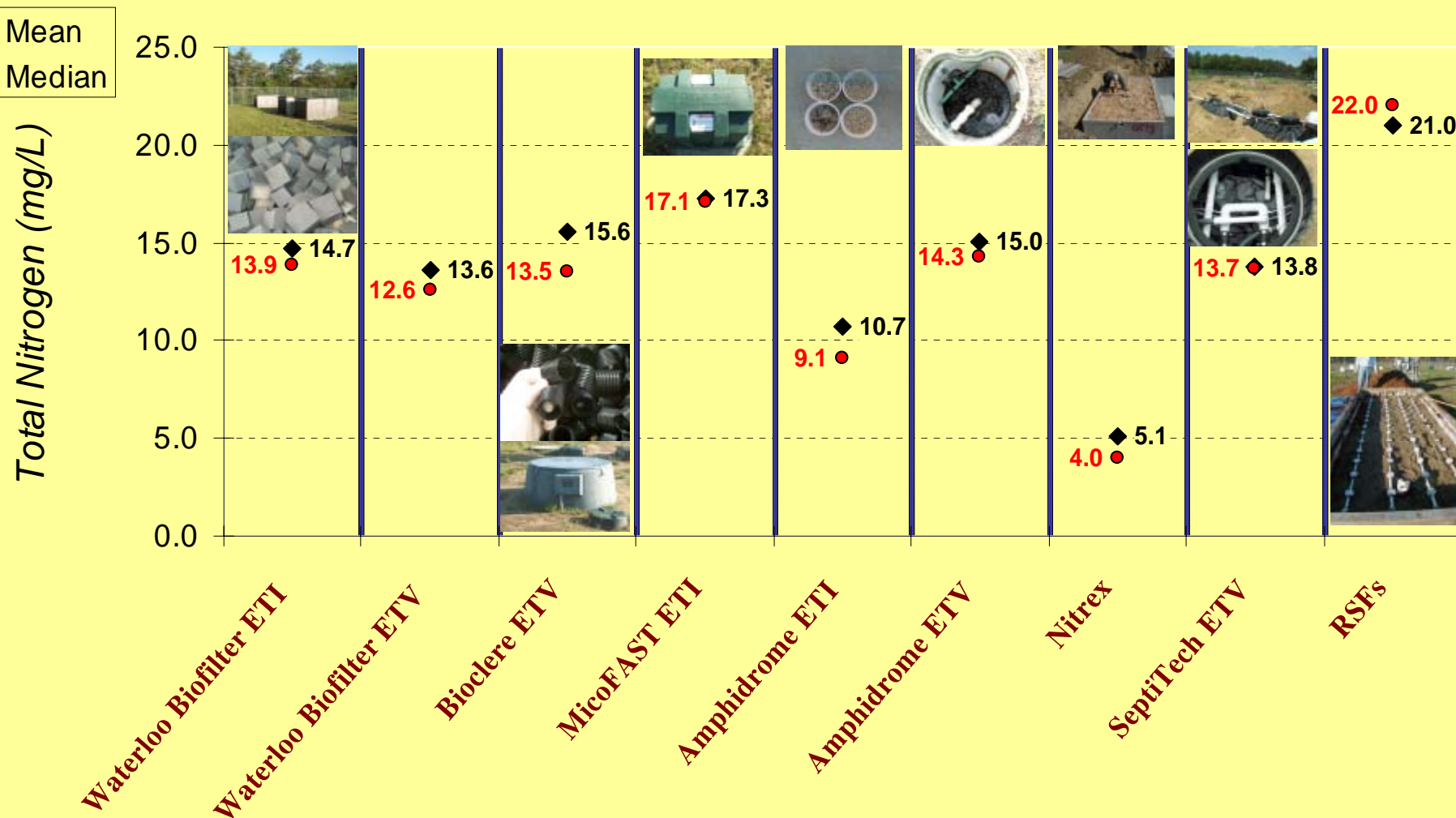
	TN (mg/l)
Mean	4.4
Median	3.3
Count	31

MicroFAST®

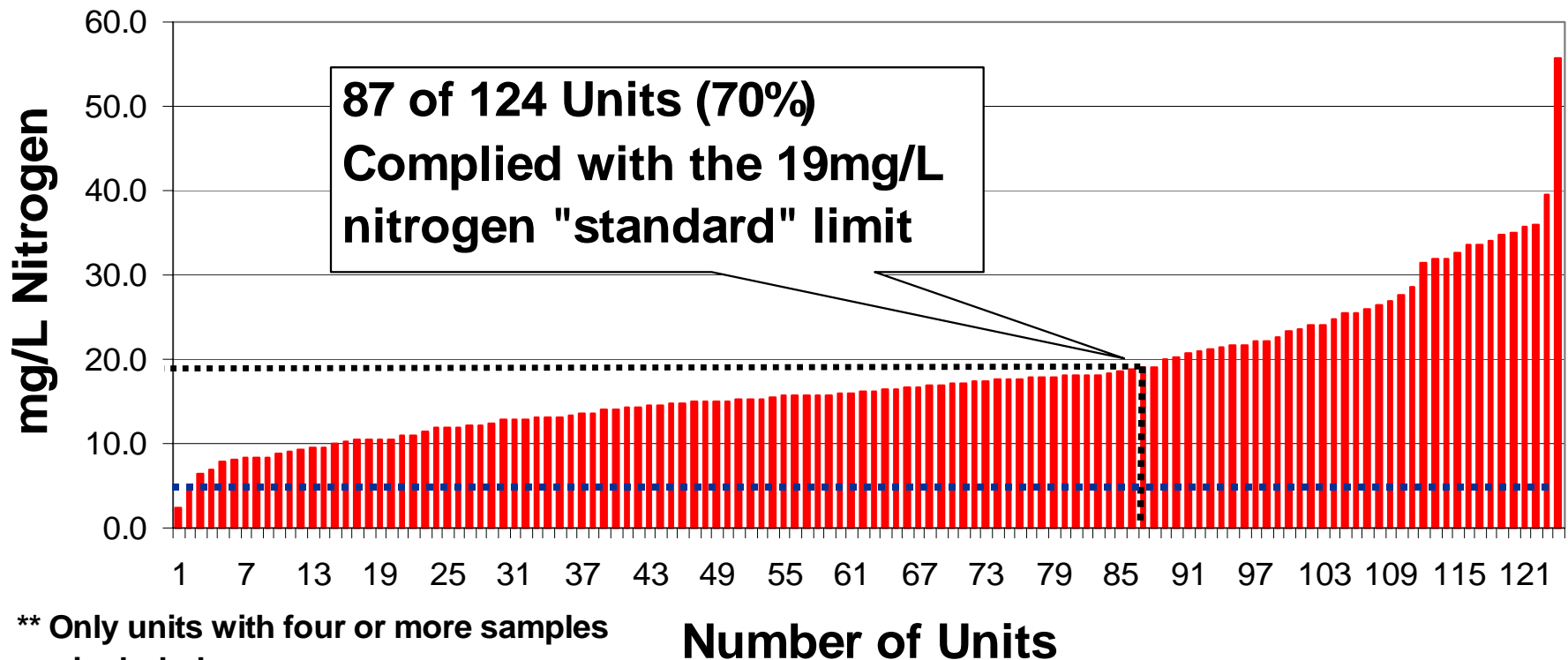


	Effluent (TN mg/l)	Influent (TN mg/l)
Mean	17.3	37.9
Median	17.1	38.0
Count	52	82

Performance Comparison of Selected Denitrification Systems Tested at the Massachusetts Alternative Septic System Test Center 1999-2003.

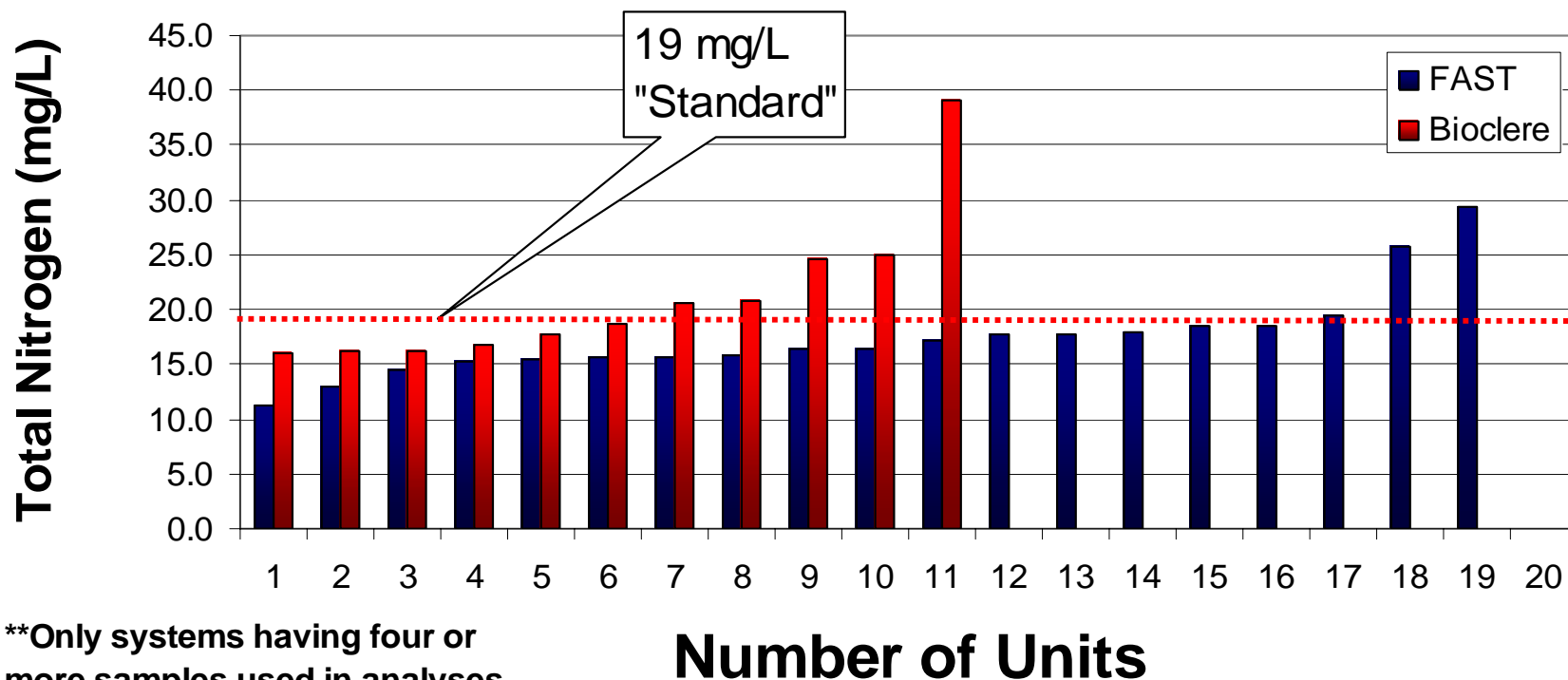


Number of FAST Units Achieving Specified Levels of Nitrogen Reduction (General Use Approval Installations)**



** Only units with four or more samples are included

Number of Advanced Treatment Units Achieving Specified Levels of Nitrogen Reduction (Provisional Use Installations)**



**Only systems having four or more samples used in analyses

The appeal of using onsite septic systems

- The individual is responsible for the operation and maintenance.
- Wastewater is treated close to the source (which generally causes more responsible wastewater disposal practices).
- There is often a perception that onsite is less expensive than other options.
- No large crowds to convince – problems are dealt with one at a time.

Challenges Associated with the Onsite Approach

- Systems need to be monitored for performance and corrected when not performing (often a cost overlooked when considering the onsite option).
- There may be limits to the treatment ability (depending on the target contaminant).
- Tracking performance to ensure that target loading limits are not exceeded (We estimate that it takes one full time person to track 1,000 systems and assist with maintaining compliance in Massachusetts).

Other Means of Dealing with Wastewater Onsite ?

- Don't create so much
 - Reuse what you make
- 
- A stylized silhouette of a mountain range in a darker shade of teal, located in the bottom right corner of the slide.

Composting Toilets

Composting toilets still need a means for safe graywater disposal

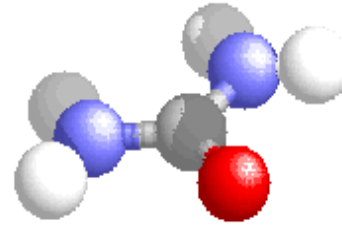


Evapotranspiration Beds



Surface and Subsurface Irrigation

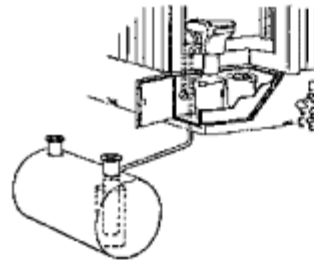




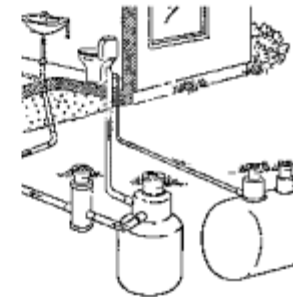
UREA IS THE MOST ABUNDANT **NITROGEN-CONTAINING** COMPOUND IN THE WASTE FROM OUR BODIES



Swedish solutions urine separation



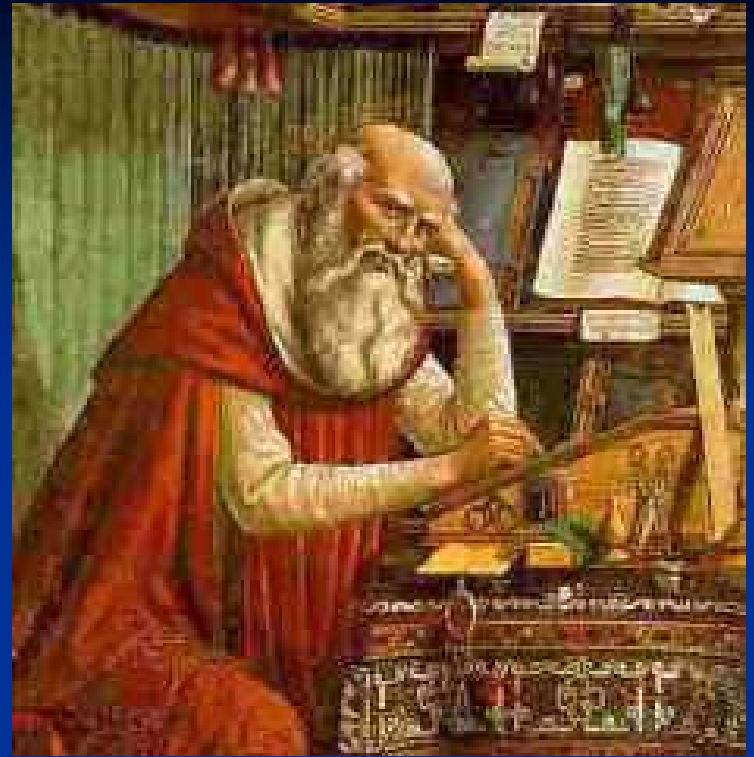
Seperate faeces and urine collection



Urine collection and septic tank

Wastewater Management

How will we know
what's best?



To make the right decision regarding wastewater planning in any community you need..

- Good assessment of the need (what are the real problems? – what are the treatment objectives?)
- Good information regarding the various alternatives
- Good community involvement ranging from buying into the need to address the problems to the selection of the alternative necessary to address it.

EDUCATION



The most likely scenario for wastewater treatment will include a wide menu of options.

- Centralized
- Cluster
- Packaged Treatment Plants
- Single onsite systems

